DF 7: Ceramics

Time: Monday 16:25–16:45 Location: H11

DF 7.1 Mon 16:25 H11

Titanate glass-ceramics for mobile applications in the GHz range — •Hubertus Braun[1,2,3], Martin Letz[2], Martun Hovhannisyan[4], and Hans-Joachim Elmers[1] — [1]Johannes-Gutenberg Universität Mainz — [2]SCHOTT AG, Mainz — [3]Graduate School Materials Science in Mainz — [4]TU Darmstadt

In recent years, the continuous growth in mobile communication technologies operating in the microwave frequency range demands cost-efficient low-loss dielectric materials with sufficiently high permittivity. In the current work, glass-ceramics in the TiO_2-SiO_2-B_2O_3-Al_2O_3 system are developed ($\varepsilon_r \sim$ 16-32, Qf $\approx$ 10.000 GHz, $|\tau_f| <$ 10 ppm/K) which have promising properties as microwave materials and offer a number of advantages in comparison to conventional sinter-ceramics. Materials which are obtained via a true glassy phase are new in this field and are an alternative to sintered ceramics. Glass-ceramics are produced in a two step process: At first, a homogeneous basic glass is casted in a conventional glass production process. Then the glass undergoes a temperature treatment with a defined temperature profile to initiate a controlled partial crystallisation of desired paraelectric phases inside the glassy matrix (Ceramisation). Obtaining materials via a homogeneous glassy phase enables intrinsic pore free materials with comparatively superior surface properties. The effect of solid solution type doping on the dielectric properties and glass stability is investigated and the glass-ceramic materials are analysed concerning suitability for dielectric loaded antenna applications. Comparative measurements with antennas using commercial sinter-ceramics are made.